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The present invention relates to insulation patches thermal and/or acoustic and their processes of obtaining.

The thermal insulation and the sound-proofing of the walls and the ceilings are essential in the field of the construction of the buildings and the houses of dwelling. With this aim, numerous materials are used.

The materials currently employed are the heat-insulating and/or soundproofing patches. These patches, generally of square or rectangular form and variable thickness, consist of different components. They generally include/understand a load in form finely divided, preferably very dispersed, having a low thermal conductivity. One employs usually like charges of the carbon black, sulphate or calcium carbonate, silica pyrogenic and/or the silica of precipitation in the form of powder.

Heat-insulating patches are also used for the insulation at high temperature of the thermal enclosures, particularly the thermal enclosures of industrial type (furnaces, drying ovens for example), the domestic furnaces with pyrolysis.

An agent of reinforcement, particularly a fibrous material, are traditionally incorporated with the load in order to improve solidity of the patch and, in certain cases, in order to reduce the thermal withdrawal to high temperatures.

Particularly for the manufacture of patches thermally insulating at high temperature, an opacifying agent, for example the titanium dioxide, is also generally incorporated with the load the opacifying agent reflects, absorbs and disperses the thermal radiation and thus constitutes an infra-red barrier.

The usual method of preparation of the patches then consists in mixing the load, optionally the opacifying agent, these two products being in the form of powder, and the agent of reinforcement, then to introduce the obtained mixture into a porous envelope, which is in general a glass fiber bag or cushion, and finally to apply a pressure to the aforementioned envelope to consolidate the particulate load and to bind the particles between them and thus to confer on the final patch certain physicomechanical properties.

However, the patches in which the load consists of carbon black, of sulphate of calcium or calcium carbonate have properties of thermal and phonic insulation and physicomechanical properties insufficient.

Moreover, if the patches manufactured, according to the process describes previously, starting from a load made up of silica in the form of powder present performances raised at the level of the thermal and phonic insulation, their physicomechanical properties, in particular their physicomechanical strength, are not also satisfying: these patches have a limited solidity; they are friable and inclined with the cracks. Moreover, the phases of mixture of the raw materials, particularly of the powders, manufacture of the bags or compression and glass fiber cushions are expensive phases and often not very easy to implement.

The purpose of the invention is thus to provide a heat-insulating and/or soundproofing patch and processes of obtaining of the aforesaid patch not presenting the aforementioned disadvantages.

Thus, one of the objects of the invention is an insulation patch thermal, with bass and high temperature, and/or acoustic, presenting good physicomechanical properties, particularly an improved physicomechanical strength, while preserving suitable performances in thermal and/or phonic insulation.

Another object of the invention consists of processes making it possible to obtain the patches improved according to the invention, processes which, moreover, include/understand steps easy implement, inexpensive and in which a step of compression is not necessary.

Other features and benefits of the invention will be included/understood better with the reading of description and the concrete but nonrestrictive examples which will follow.

The thermal and/or acoustic insulation patch according to the invention is characterized in that it includes/understands a dried mixture:

of silica of precipitation consisted a cake of filtration resulting from the reaction of precipitation and surbedded,
of at least an agent of reinforcement,
optionally, of at least an opacifying agent.

One understands by silica of precipitation any silica obtained by reaction of a silicate with an acid. The mode of preparation of silica can be unspecified (particularly, acid addition on a foot of silicate tank, simultaneous addition total or partial of acid and silicate on a foot of tank of water or silicate solution).

According to the invention, silica precipitated employed is consisted of the cake of filtration resulting from the reaction of precipitation and surbedded.

In other words, one carries out the precipitation of silica, one obtains a cake of filtration which is washed so necessary. This cake is then surbedded.

In general, one can use, in the frame of the present invention, silicas of precipitation having once dried a specific surface Study Bureau ranging between 80 and 400 m< 2> /g, preferably between 100 and 300 m< 2> /g and a specific surface CTAB ranging between 80 and 350 m< 2> /g, preferably between 100 and 250 m< 2> /g

Preferably, silicas of precipitation employed are relatively porous: they generally once have dried a total porous volume ranging between 1 and 5 cm< 3> /g, preferably between 2 and 4 cm< 3> /g.

The cake of present filtration usually a dry matter rate of at least 10% in weight, preferably ranging between 10 and 30% in weight.

The agent of reinforcement contained in the patch according to the invention preferably consists of fibres of reinforcement, for example selected in the formed group by aluminium silicate fibres, the fibres of alumina, inorganic wool the fibres, the glass fibres, quartz the fibres, the ceramic fibres, the cellulosic fibres.

The glass fibres constitute an agent of prefered reinforcement in the frame of the present invention.

According to an embodiment of the invention, the heat-insulating and/or soundproofing patch includes/understands a dried mixture:

of silica of precipitation consisted a cake of filtration resulting from the reaction of precipitation and surbedded, and
of at least an agent of reinforcement.

This patch is particularly intended for the thermal insulation with low temperature (for example between 0 and 200 Degree C), for the acoustic insulation and, optionally, a use as firebreak.

This patch includes/understands, preferably, 75 to 99% in silica weight dry and 1 to 25% in weight of agent of reinforcement, and, of manner even more prefered, 90 to 98,5% in silica weight dry and 1,5 to 10% in weight of agent of reinforcement.

One understands by silica dry the silica of precipitation, consisted the cake of filtration resulting from the reaction of precipitation and surbedded, after drying of the aforesaid mixture.

According to another embodiment of the invention, the heat-insulating and/or soundproofing patch includes/understands a dried mixture:

of silica of precipitation consisted a cake of filtration resulting from the reaction of precipitation and surbedded,
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of at least an agent of reinforcement, and
of at least an opacifying agent.

This patch is particularly intended for the thermal insulation at high temperature (for example until at least 750 Degree C), same if its use for the acoustic insulation is possible.

This patch then includes/understands generally 45 to 90% in silica weight dry, 9 to 50% in weight of opacifying agent and 0,5 to 15% in weight of agent of reinforcement, and, preferably, 55 to 80% in silica weight dry, 15 to 40% in weight of opacifying agent and 1 to 10% in weight of agent of reinforcement.

A beneficial composition of the aforesaid patch is the following one:

65 to 75% in silica weight dry,
20 to 30% in weight of opacifying agent, and
1 to 10% in weight of agent of reinforcement.

The opacifying agent, which constitutes an infra-red barrier, is generally selected in the formed group by chromium oxide, the zirconium oxide, the iron oxide, titanium the dioxide, manganese the dioxide, quartz the powder, the silicon carbide, the boron carbide, the tantalum carbide, the carbon black, graphite.

The titanium dioxide, particularly in form ore (for example the ilmenite), constitutes a prefered opacifying agent in the frame of the present invention.

Generally in the purpose optimizing the mechanical behaviour and the cohesion of the heat-insulating and/or soundproofing patch according to the invention, the mixture to dry to form the aforementioned patch can also contain silica of precipitation in the form of powder (in addition to the silica of precipitation consisted a cake of filtration resulting from the reaction of precipitation and surbedded), the aforementioned patch then including/understanding in general 0 to 12%, preferably 1 to 10%, in weight of the aforesaid the silica of precipitation in the form of powder. Beyond 12%, the patch is generally inclined with the cracks.

This silica of precipitation in the form of present powder generally a specific surface Study Bureau ranging between 80 and 400 m< 2> /g, preferably between 100 and 300 m< 2> /g, a specific surface CTAB ranging between 80 and 350 m< 2> /g, preferably between 100 and 250 m< 2> /g and a total porous volume ranging between 1 and 5 cm< 3> /g, preferably between 2 and 4 cm< 3> /g.

The patch according to the invention can include/understand a dried mixture of the components mentioned previously (optionally at least an opacifying agent and/or silica of precipitation in the form of powder) and, particularly in the purpose improving cohesion of the aforesaid patch under all its conditions of use, of sodium an aqueous silicate solution with a content lain in general between 0 and 5%, preferably between 0,5 and 3%, calculated in dry silicate weight compared to the weight of the patch.

Solution of the present sodium silicate optionally used usually a dry matter rate ranging between 15 and 60% in weight, for example between 25 and 45% in weight.

The patches according to the invention can be presented in different forms; in general, they have a square or, preferably, rectangular configuration, like one thickness variable.

In accordance with the invention, the processes of obtaining of the patches described previously are particularly characterized in that they use as raw material a cake of filtration resulting from the reaction of precipitation of a silica, such a use constituting one also of the objects of the invention.

The agent of reinforcement can be added to the cake of filtration front the disintegration, at the time of the disintegration ou/et after the disintegration. It is the same for the opacifying agent (if one wishes that the final patch contains some), that one can not add at the same stage as the agent of reinforcement.

A first embodiment of the process of obtaining of a patch according to the invention is characterized in that it includes/understands the following steps:

1) one surbeds, in the presence of with less one agent of reinforcement and possibly of at least agent opacifying (thus in presence also of this last when one wishes that the final patch contains some), a cake of filtration resulting from the reaction of precipitation of a silica the agent of reinforcement can thus be added to the cake of filtration front the disintegration or at the time of the disintegration; it is the same for the optional opacifying agent;
2) one introduces the slurry obtained at the end of step 1) into a mould;
3) one dry slurry contained in the aforementioned mould;
4) optionally, one unmoulds the patch obtained at the end of step 3).

A second embodiment of the process of obtaining of a patch according to the invention is characterized in that it includes/understands the following steps:

1) one surbeds a cake of filtration resulting from the reaction of precipitation of a silica;
2) one mixes the slurry obtained at the end of step 1) with at least an agent of reinforcement and optionally at least an opacifying agent (thus with also this last when one wishes that the final patch contains some);
3) one introduces the slurry obtained at the end of step 2) into a mould;
4) one dry slurry contained in the aforementioned mould;
5) optionally, one unmoulds the patch obtained at the end of step 4).

Another embodiment of the process of obtaining of a patch according to the invention is characterized in that it includes/understands the following steps:

1) one surbeds, in the presence of with less the one agent of reinforcement (respectively at least an opacifying agent), a cake of filtration resulting from the reaction of precipitation of a silica; the aforementioned agent of reinforcement (respectively the aforementioned opacifying agent) can thus be added to the cake of filtration front the disintegration or at the time of the disintegration;
2) one mixes the slurry obtained at the end of step 1) with at least an opacifying agent (respectively at least an agent of reinforcement);
3) one introduces the slurry obtained at the end of step 2) into a mould;
4) one dry slurry contained in the aforementioned mould;
5) optionally, one unmoulds the patch obtained at the end of step 4).

When they are used, the silica of precipitation in the form of powder and/or sodium the aqueous silicate solution are added at the time of one of the steps preceding the step by introduction by the slurry into the mould.

The drying, which present generally an essential character, is carried out preferably by bearings of temperature. The speed of drying must be preferably enough slow so, particularly, not causing a crack, which could involve a sensitive deterioration of the properties of insulation of the final patch.

Thus, l' step of drying is carried out preferably by successive bearings of temperature.

The step of drying can particularly be carried out by the following successive bearings of temperature:

a) a first bearing ranging between 30 and 80 DEGREE C, preferably between 35 and 65 DEGREE C, particularly between 40 and 60 DEGREE C, pendent 0,5 to 3 p.m., preferably 1 to 1 p.m.;
b) a second bearing ranging between 90 and 200 DEGREE C, preferably between 100 and 140 DEGREE C, particularly between 110 and 130 DEGREE C, pendent 0,5 to 3 p.m., preferably 1 to 1 p.m.;
c) optionally, a third bearing ranging between 450 and 850 DEGREE C, preferably between 600 and 800 DEGREE C, pendent 2 to 140 minutes, preferably 5 to 130 minutes, for example 5 to 20 minutes.

The step of drying can also be carried out by the following successive bearings of temperature:

a) a first bearing ranging between 30 and 60 DEGREE C, preferably between 40 and 55 DEGREE C, pendent 0,5 to 3 p.m., preferably 1 to 1 p.m.;
b) a second bearing ranging between 60 and 80 DEGREE C, preferably between 65 and 75 DEGREE C, pendent 0,5 to 3 p.m., preferably 1 to 1 p.m.;
c) a third bearing ranging between 90 and 115 DEGREE C, preferably between 95 and 105 DEGREE C, pendent 0,5 to 3 p.m., preferably 1 to 1 p.m.;
d) a fourth bearing ranging between 115 and 200 DEGREE C, preferably between 120 and 140 DEGREE C, pendent 0,5 to 3 p.m., preferably between 1 to 1 p.m.;
e) optionally, a fifth bearing ranging between 450 and 850 DEGREE C, preferably between 600 and 800 DEGREE C, pendent 2 to 140 minutes, preferably 5 to 130 minutes, particularly 5 to 20 minutes.

Preferably, the step of drying includes/understands the last bearing between 450 and 850 DEGREE C, because it particularly makes it possible to limit even more the water absorption of the final patch.

In general, previously to the step of drying, the mould containing the slurry is subjected to vibrations.

The shape and the thickness of the mould depend on those desired for the patch that one want to obtain; the mould present usually a square or, preferably, rectangular configuration.

The moulding can be carried out uninterrupted or into discontinuous.

The following examples illustrate the invention without however limiting the range of it.

EXAMPLE 1 Preparation of a patch according to the invention

One surbeds a cake of filtration, having a dry matter rate of 21% in weight, resulting from the reaction from precipitation from a silica, this silica having a specific surface Study Bureau of 170 m< 2> /g, a specific surface CTAB of 160 m< 2> /g and a total porous volume of 2,5 cm< 3> /g.

One mixes then 1,5 kg of the aforesaid cake surbedded with 7 G of glass fibres (of 14 mm long).

One introduces the slurry obtained after kneading into a cuboid mould of dimensions 100 X 70 X 10 (mm).

Then one dry slurry contained in the mould according to following successive bearings' of temperature:

to 50 pendent DEGREE C 2,5 hours,
to 70 pendent DEGREE C 12 hours,
to 100 pendent DEGREE C 12 hours,
to 130 pendent DEGREE C 2 hours,
to 750 pendent DEGREE C 2 hours.

One unmoulds finally the patch obtained at the end of drying.

This patch contains 98% in silica weight dry and 2% in glass fibre weight. Its density is 0,325.

EXAMPLE 2 Preparation of a patch according to the invention

One surbeds a cake of filtration, having a dry matter rate of 23% in weight, resulting from the reaction from precipitation from a silica, this silica having a specific surface Study Bureau of 180 m< 2> /g, a specific surface CTAB of 170 m< 2> /g and a total porous volume of 2,4 cm< 3> /g.

One mixes then 1 kg of the aforesaid cake surbedded with 60 G of ore of dioxide of titanium (ilmenite) and 14 G of glass fibres (of 14 mm long).

One introduces the slurry obtained after kneading into a cuboid mould of dimensions 100 X 70 X 10 (mm).

Then one dry slurry contained in the mould according to following successive bearings' of temperature:

to 50 pendent DEGREE C 2,5 hours,
to 70 pendent DEGREE C 12 hours,
to 100 pendent DEGREE C 12 hours,
to 130 pendent DEGREE C 2 hours,
to 750 pendent DEGREE C 2 hours.

One unmoulds finally the patch obtained at the end of drying.

This patch contains 75% in silica weight dry, 20% in titanium dioxide weight and 5% in glass fibre weight. Its density is 0,450.

EXAMPLE 3 Preparation of a patch according to the invention

One surbeds a cake of filtration, having a dry matter rate of 21% in weight, resulting from the reaction from precipitation from a silica, this silica having a specific surface Study Bureau of 170 m< 2> /g, a specific surface CTAB of 160 m< 2> /g and a total porous volume of 2,5 cm< 3> /g.

One mixes then 2 kg of the aforesaid cake surbedded with 136 G of ore of dioxide of titanium (ilmenite) and 12 G of glass fibres (of 14 mm long).

One introduces the slurry obtained after kneading into a cuboid mould of dimensions 100 X 70 X 10 (mm).

Then one dry slurry contained in the mould according to following successive bearings' of temperature:

to 50 pendent DEGREE C 2,5 hours,
to 70 pendent DEGREE C 12 hours,
to 100 pendent DEGREE C 12 hours,
to 130 pendent DEGREE C 2 hours,
to 750 pendent DEGREE C 2 hours.

One unmoulds finally the patch obtained at the end of drying.

This patch contains 74% in silica weight dry, 24% in titanium dioxide weight and 2% in glass fibre weight. Its density is 0,445.

EXAMPLE 4 Preparation of a patch according to the invention

One surbeds a cake of filtration, having a dry matter rate of 21% in weight, resulting from the reaction from precipitation from a silica, this silica having a specific surface Study Bureau of 170 m< 2> /g, a specific surface CTAB of 160 m< 2> /g and a total porous volume of 2,5 cm< 3> /g.

One mixes then 2 kg of the aforesaid cake surbedded with 107 G of ore of dioxide of titanium (ilmenite), 30 G of glass fibres (of 14 mm long) and 52 G of silica of precipitation in the form of powder; the aforementioned silica present a specific surface Study Bureau of 180 m< 2> /g, a specific surface CTAB of 170 m< 2> /g and a total porous volume of 2,4 cm< 3> /g.

One introduces the slurry obtained after kneading into a cuboid mould of dimensions 100 X 70 X 10 (mm).

Then one dry slurry contained in the mould according to following successive bearings' of temperature:

to 50 pendent DEGREE C 2,5 hours,
to 70 pendent DEGREE C 12 hours,
to 100 pendent DEGREE C 12 hours,
to 130 pendent DEGREE C 2 hours,
to 750 pendent DEGREE C 2 hours.

One unmoulds finally the patch obtained at the end of drying.

This patch contains 69% in silica weight dry (ex-cake), 17,5% in titanium dioxide weight, 8,5% in silica weight (ex-powder) and 5% in glass fibre weight. Its density is 0,470.

EXAMPLE 5 Preparation of a patch according to the invention

One surbeds a cake of filtration, having a dry matter rate of 21% in weight, resulting from the reaction from precipitation from a silica, this silica having a specific surface Study Bureau of 170 m< 2> /g, a specific surface CTAB of 160 m< 2> /g and a total porous volume of 2,5 cm< 3> /g.

One mixes then 2 kg of the aforesaid cake surbedded with 105 G of ore of dioxide of titanium (ilmenite), 31 G of glass fibres (of 14 mm long), 53 G of silica of precipitation in the form of powder (the aforementioned silica having a specific surface Study Bureau of 180 m< 2> /g, a specific surface CTAB of 170 m< 2> /g and a total porous volume of 2,4 cm< 3> /g) and 26 G of sodium an aqueous silicate solution having a dry matter rate of 35% in weight.

One introduces the slurry obtained after kneading into a cuboid mould of dimensions 100 X 70 X 10 (mm).

Then one dry slurry contained in the mould according to following successive bearings' of temperature:

to 50 pendent DEGREE C 2,5 hours,
to 70 pendent DEGREE C 12 hours,
to 100 pendent DEGREE C 12 hours,
to 130 pendent DEGREE C 2 hours,
to 750 pendent DEGREE C 2 hours.

One unmoulds finally the patch obtained at the end of drying.

This patch contains 68% in silica weight dry (ex-cake), 17% in titanium dioxide weight, 8,5% in silica weight (ex-powder), 5% in glass fibre weight and 1,5% in dry sodium silicate weight. Its density is 0,470.